U.S. Department
of Transportation

**Research and
Special Programs
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

JUN - 6 2001

Mr. Robert J. Ten Eyck
Director, Technical Services
TEN-E Packaging Services Inc.
1666 County Road 74
Newport, Minnesota 55055

Ref. No. 01-0141

Dear Mr. Ten Eyck:

This is in response to your letter of April 24, 2001 and our recent conversations concerning whether an overpack for oxygen cylinders manufactured by Aviation Mobility conforms to the provisions of Air Transport Association (ATA) Specification 300 for Category I shipping containers and, in turn, the provisions of 49 CFR 172.102, Special Provision A52. Your inquiry responds to a memorandum dated March 6, 2001, from me to Mr. William Wilkening, Manager, Dangerous Goods and Cargo Security, Federal Aviation Administration (FAA) in which I set forth a number of concerns as to why it did not appear, based on a review of photographs provided us, that this overpack satisfied the ATA provisions or the 49 CFR requirements.

As indicated in our March 6 memorandum, in adopting an overpack provision for oxygen cylinders in the final rule issued under Docket HM-224A (August 19, 1999), we referenced the ATA 300 standard as an interim provision because the airlines had containers meeting this standard readily available and because the rigid containers in use were shown, in testing by the FAA, to provide a degree of additional protection to an oxygen cylinder, particularly with regard to thermal resistance. It is doubtful that the Aviation Mobility fabric bag overpack provides an equivalent degree of thermal resistance to a rigid overpack as tested by the FAA. However, based on the information provided by you, it is our opinion that it meets the ATA 300 standard and is acceptable for use under the current provisions of Special Provision 52.

Thank you for providing additional information concerning the design and testing of the Aviation Mobility overpack and a sample of it so that we could better evaluate it. Some of the considerations taken in arriving at our opinion are as follows:

- The overpack has been tested in accordance with the ATA Standard, including a penetration test, and has passed these tests.
- As evidenced by the letter dated April 11, 2001 from Mr. Frank Black of ATA to Mr. Wilkening, it appears that ATA believes the packaging meets its standard.
- As indicated by the information you provided, provisions of the ATA standard are flexible enough to accommodate packagings not made of metal, plastic or fiberboard, to include a non-rigid fabric bag.
- The overpack is of a size not requiring a stack test.

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- As indicated in our discussions and the information provided, the bag incorporates cushioning and top and bottom pads which provide additional protection to the cylinder for both the drop test and the penetration test.

Our August 1999 final rule contains the following statement:

> Based on the FAA testing, RSPA believes that any increase in risk posed by the presence of a compressed oxygen cylinder in a cargo compartment can be significantly reduced, or even eliminated, if the oxygen cylinder is placed in an outer packaging or overpack that provides more thermal protection and flame resistance than the ATA 300 overpacks currently in use. To this end, RSPA is developing proposed enhanced standards for these outer packagings or overpacks, including a proposed date for their implementation.

You should be aware that we are working with the FAA on a notice of proposed rulemaking proposing these revised standards and expect to issue it soon.

This response has been coordinated with the FAA. If we can be of further assistance, please contact us.

Sincerely,

Edward T. Mazzullo

Edward T. Mazzullo
Director, Office of Hazardous Materials Standards

cc: Mr. Miles R. Craig
Mr. Frank Black
Mr. Chuck Carlo

TEN E

Setting the Standard

Mazzullo
File: 172.102
Ref. No. 01-0141

April 24, 2001

Edward T. Mazzullo
Office of Hazardous Materials Standards
U.S. DEPARTMENT OF TRANSPORTATION
Research and Special Programs Administration
DHM-10
400 Seventh Street, S.W.
Washington, DC 20590

Dear Ed:

As discussed on the phone yesterday, TEN-E Packaging Services has been involved with a review of Aviation Mobility's nylon fabric over pack system used to package cylinders of Oxygen for shipment by air. TEN-E was asked to initially review the container design for compliance with ATA Specification 300 for Category I shipping containers. It was our conclusion that the container design met the guidelines established by ATA. We were then asked to conduct the various performance tests necessary to qualify the packaging under this ATA standard. The latest design qualification testing was completed on March 1st and documented under TEN-E Packaging Services' Report #01-1036.

The following information is offered in support of Aviation Mobility's Oxygen cylinder packaging as a qualified ATA 300 Category I container:

- Section 1-1 outlines the purpose of ATA 300 and states "Sufficient flexibility has been incorporated in these guidelines to permit desirable technological developments in the packaging field." The construction standards are quite general and the determining factor for conformance is the packaging's ability to meet the performance standards. The stated ATA purpose is quite similar to RSPA's preamble comments when adopting Performance-Oriented Packaging Standards under Docket HM-181. Quoting from the Federal Register of December 21, 1990, "This action will promote flexibility and technological innovation in packaging."
- Section 1-4 says that one of the objectives of the specification is to "provide sufficient protection with a minimum of tare weight and cube consistent with optimum packaging versatility." The Aviation Mobility container design is a lightweight, cube efficient design that protects the inner cylinder from the environmental elements and distribution forces prescribed by Appendix B of ATA Specification 300.
- Section 7-1 describes the purpose of the design and performance tests as "intended to produce a given container that will be capable of containing an item and protecting it from damage.." The package design is more than a nylon fabric bag, it is a multi-component system that consists of the nylon fabric, urethane foam sidewalls and top and bottom rubber pads. The cushioning system dampens the drop impact and repetitive shock vibrational forces encountered during conditions normally incident to transportation. The top pad cushioning plays an important role in protecting the cylinder's valve assembly during the top diagonal drop testing. Without this over pack system, the cylinder, even with its protective metal collar would not survive the cumulative effect of 40 diagonal top drops from a height of 36".
- Section 7-2-1 prescribes a penetration test that TEN-E Packaging Services conducted as a part of the certification program. The fabric demonstrated adequate tensile properties to resist tearing and the cushioning system helps to dampen the acceleration force of the falling dart.

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- Section 7-2-3 on configuration and size says "Size of packages is extremely critical and must be restricted to the minimum commensurate with the dimensions and fragility of the item packaged." A cylindrical over pack design is the most efficient design and material usage for the Oxygen cylinder. The packaging design meets the stated objective for the ATA 300 Specification.

- Section 7-2-10 requires that any container with a surface area exceeding .37 square meters (573.5 square inches) undergo a stackability test. The cross-section area of the Aviation Mobility package is 33.2 square inches and therefore does not fall subject to this test requirement.
- Appendix B calls for the drop tests to be conducted in accordance with ASTM D 775. This standard was discontinued by ASTM in 1994 and replaced with ASTM D 5276 Standard Test Method for Drop Test of Loaded Containers by Free Fall. The scope of ASTM D 5276 clarifies that the test method "covers procedures for drop testing of loaded boxes, cylindrical containers, and bags and sacks by the free-fall method."
- The definition section of ATA Specification 300 defines "Rigid Pack" as "For the purposes of this specification, a rigid pack is a package such as a fiberboard container, folding carton, or padded bag that affords greater protection than a paper or plastic bag." TEN-E would have difficulty arguing that the package is a truly "rigid" design, but it certainly meets the description of a "padded bag" and as discussed earlier, the complete package system does offer good protection for the Oxygen cylinder.
- Frank Black, Director of Cargo Services for ATA has written a letter of support for this package design under the ATA Specification 300 guidelines and a copy is enclosed for your review.
- TEN-E does not have any data on the thermal resistance of this packaging system. We are however aware of the fact that Aviation Mobility is working to modify its design for anticipated heat and fire test requirements mentioned in Docket HM-224A.

Please do not hesitate to contact us should you require any additional information. We do ask that DOT provide a quick response on this packaging matter since Aviation Mobility has a number of units in the field and has orders pending for this packaging design.

Sincerely,

Robert J. Ten Eyck
Director, Technical Services